

AMENDMENT UNDER 37 C.F.R. § 1.114(c)
U.S. Appln. No. 10/050,573
Attorney Docket No.: Q66582

REMARKS

Claims 1-12 and 15-24 are all the claims pending in the Application. By this Amendment, Applicant amends 1-3, 15, and 17 to further clarify the invention and claims 4-6, 8-12, and 16 for conformity therewith. By this Amendment, Applicant cancels claims 12 and 13 and adds new claims 18-24. Claims 18-24 are supported throughout the specification *e.g.*, Fig. 4 and pages 10-14 of the specification.

I. Summary of the Office Action

Claims 1-17 presently stand rejected. Specifically, the Examiner rejected claim 16 under 35 U.S.C. § 112, second paragraph. The Examiner further maintained the rejection of claims 1, 2, and 7 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,274,476 to Lee (hereinafter “Lee”). The Examiner also rejected claims 1-3, 5, 6, and 13-17 under 35 U.S.C. § 102(b) as being anticipated by a newly found reference, U.S. Patent No. 5,051,798 to Kimura (hereinafter “Kimura”), and claims 3, 4, and 8-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,713 to Sato (hereinafter “Sato”) in view of U.S. Patent No. 6,331,873 to Burke et al. (hereinafter “Burke”).

II. Claim Rejections under 35 U.S.C. § 112

Claim 16 is rejected under 35 U.S.C. § 112, second paragraph. Applicant respectfully requests the Examiner to withdraw this rejection of claim 16 in view of the self-explanatory claim amendment being made herein.

III. Claim Rejections under 35 U.S.C. § 102

Claims 1, 2, and 7 are allegedly anticipated by Lee and claims 1-3, 5, 6, and 13-17 are allegedly anticipated by Kimura. Applicant respectfully traverses these rejections in view of the following comments.

The Examiner contends that Lee and Kimura suggest each feature of the independent claim 1. This rejection is not supportable for at least the following reason. Independent claim 1 recites: “transferring and outputting the moved charges along the charge transfer paths disposed on both sides of the plurality of light receiving units,... each of the plurality of light receiving units is connected to a light receiving path on each side to permit the charges to exit from both sides of the light receiving units...[and] said each light receiving unit is a single, integrally formed, storage container for storing the generated charges.” These features were previously recited in the pending claim 5.

Lee, on the other hand, discloses a CCD image sensor having a plurality of VCCDs each formed in a zig-zag pattern in a vertical direction and a plurality of groups of first to fourth photodiodes. Lee, however, only discloses conventional photodiodes. That is, in Lee, each photodiode only has one exit through which the charges are transferred (Figs. 5 and 6; *see* Abstract, col. 4, lines 7 to 31 and col. 5, line 41 to col. 6, line 2). In other words, in Lee, each photodiode is a single conventional light receiving unit that accumulates charges and transmits the charges via one exit (Fig. 5). Furthermore, the pair of photodiodes of Lee (*alleged light receiving unit*) is not a single, integrally formed storage container but two (*i.e. a pair*) separate storage containers.

Kimura is similar to the conventional techniques and is no different from Mitzutani, previously made of record. That is, Kimura discloses a vertical charge transmission section 1,

which has a number of photoelectric conversion regions 4. The conversion region 4 includes a number of n-type impurity regions 7 aligned vertically. Each region corresponds to a pixel (Fig. 2; col. 6, lines 10 to 18). Kimura further discloses a vertical charge transfer region 5 and a drain region 3. Specifically, the vertical charge transfer region 5 transfer charges from a corresponding impurity regions 7 to the horizontal charge transfer region 2, whereas the superfluous charges are purged to the overflow drain region 3 by applying a predetermined potential to a gate electrode 34 of the overflow drain section 3 (Fig. 2; col. 6, line 39 to col. 7, line 14).

That is, Kimura, just like in the conventional devices discussed in the background section of the specification, only has one charge transfer path along the row of plurality of light receiving units. In other words, in Kimura, along one row there is only one charge transfer path, *i.e.*, the vertical charge transfer region 5. The overflow drain section 3 is not a path for transferring and outputting charges but an area that absorbs charges. In short, Kimura discloses that the overflow drain section 3 absorbs extra charges and does not disclose the charges being transferred by the overflow drain section 3.

Furthermore, independent claim 1 recites: “obtaining a signal value indicating quantity of light received by a light receiving unit from the plurality of light receiving units, wherein the signal value is obtained by adding charges that have been accumulated in the same light receiving unit and that were separated to move through different light receiving paths positioned on each side of the same light receiving unit.” Lee and Kimura fail to disclose or suggest these unique features of claim 1.

In summary, the deficiencies of the Lee and Kimura references fall to the Examiner's burden to show inherent inclusion of the claim elements. Therefore, for all the above reasons, independent claim 1 is patentable.

Independent claims 2 and 3 recite features similar to, although not necessarily coextensive with, the features argued above with respect to claim 1. Therefore, arguments presented with respect to claim 1 are respectfully submitted to apply with equal force here. For at least substantially analogous, exemplary reasons, therefore, independent claims 2 and 3 are patentably distinguishable from Lee and from Kimura.

In addition, claim 3 recites: "each of said plurality of light receiving units includes a plurality of segments separated by a potential barrier so that charges stored in said plurality of light receiving units are moved to said plurality of charge transfer paths." In Kimura, there is no barrier in the impurity region 7. For at least this additional, exemplary reason, claim 3 patentably distinguishes from Kimura.

Claim 5-7 and 15-17 are patentable at least by virtue of their dependency on claims 1, 2, or 3.¹

With respect to the dependent claims 15-17, the Examiner contends that they are rejected under 35 U.S.C. § 102(a) as being anticipated by Kimura, as modified by Burke, (see pages 8 and 9 of the Office Action). The Examiner, however, fails to provide *any* indication as to the relevance of Burke with respect to claims 15-17. Moreover, if Burke is used to modify Kimura, this should have been a rejection under 35 U.S.C. § 103(a) and motivation for combining the two

¹ Claims 13 and 14 have been canceled.

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references should have been provided. Applicant respectfully requests the Examiner to clarify his position with respect to the dependent claims 15-17.

In addition, dependent claim 15 recites: “wherein charges exiting from each of said plurality of light receiving units are received by charge transfers paths on both sides of a respective light receiving unit and are subsequently converted into digital values by a converter.” Kimura only discloses one charge transfer path. In Kimura, the charges in the overflow drain section 3 are purged out through the purge drain 17 (col. 7, lines 26 to 31). These charges are not converted into digital values and are not read. The charges in the overflow drain section 3 are extra charges removed from the impurity regions 7 to avoid bleeding. For at least this additional exemplary reason, claim 15 is patentably distinguishable from Kimura.

IV. Claim Rejection under 35 U.S.C. § 103

Claims 3, 4, and 8-12 are rejected as being unpatentable over Sato in view of Burke. Applicant respectfully traverses this rejection in view of the following comments.

Of these rejected claims, only claim 3 is independent. Independent claim 3 requires: “a plurality of charge transfer paths disposed on both sides of said plurality of light receiving units for receiving the charges exiting from said plurality of light receiving units and for transferring and outputting the received charges;... an addition unit for obtaining a signal value indicating quantity of light received by a light receiving unit from the plurality of light receiving units, wherein the signal value is obtained by adding charges that have been accumulated in the same light receiving unit and that were separated to move through different light receiving paths positioned on each side of the same light receiving unit, wherein said each of said plurality of light receiving units is a single, integrally formed, storage container for the received charges.”

At least these unique features are not taught or suggested by the combined disclosure of Sato and Burke.

In response to Applicant's arguments, the Examiner contends that Sato's CCD sections A, B, C, and D correspond to light receiving units claimed in claim 3 and that the respective horizontal transfer paths 126A-D are the transfer paths set forth in claim 3. The Examiner further contends that since one CCD section is part of the plurality, the horizontal transfer paths transfer charges from the plurality of CCD sections (*see* page 3 of the Office Action). Applicant respectfully disagrees.

The position set forth in the Office Action is logically flawed. This logical flaw eradicates the difference between common paths and dedicated paths. This is illustrated with the following example. A number of drinking glasses are provided. Each glass is filled with water and has its own dedicated straw *i.e.*, the straw is used only for its respective glass. Clearly, one cannot state that since water can be sucked from a glass using the dedicated straw, the straw is used to suck the water from a number of glasses. Such reasoning is logically flawed as each dedicated straw is only used for its respective glass and is not a common straw shared between various glasses.

Similarly, in Sato, each horizontal transfer path 126A-126D is a dedicated transfer path for its respective section (Fig. 2; col. 7, lines 1 to 20). That is, each transfer path is not and cannot be used to transfer charges from the other sections. In short, Sato fails to disclose or suggest common paths that transfer charges from a number of CCD sections. Moreover, Sato's sections A, B, C, and D are not integrally formed storage containers. Instead, Sato's sections A, B, C, and D are formed of a number of separate CCD elements (Fig. 2; col. 6, lines 23 to 33).

Further, Sato's horizontal paths 126A-126D (Fig. 2) are not disposed on both sides of each CCD section. That is, in Sato, each section A, B, C, and D has only one transfer path 126A, B, C, and D, respectively (see Fig. 3 and col. 7, lines 1 to 20). In other words, in Sato, each section has only one transfer path on one side.

In short, Sato fails to disclose or suggest a plurality of charge transfer paths disposed on both sides of said plurality of light receiving units for receiving the charges exiting from said plurality of light receiving units and for transferring and outputting the received charges, wherein said each of said plurality of light receiving units is a single, integrally formed, storage container for the received charges. In Sato, each transfer path is dedicated to its respective CCD section. Burke does not cure these deficiencies of Sato.

Together, the combined teachings of these references would not have (and could not have) led the artisan of ordinary skill to have achieved the subject matter of claim 3. Accordingly, claim 3 is patentable over the combined teachings of Sato and Burke. Claims 4 and 8-12 are patentable at least by virtue of their dependency on claim 3.

In addition, dependent claim 4 recites: "wherein the plurality of segments are four segments obtained by separating each of said plurality of light receiving units with an internal cruciform potential barrier." The Examiner alleges that Sato discloses these unique features of claim 4 (*see* page 11 of the Office Action). This directly contradicts the position set forth in the Office Action with respect to independent claim 3 on which claim 4 depends. That is, with respect to claim 3, the Examiner acknowledges that Sato does not disclose or suggest a potential barrier (*see* page 3 of the Office Action).

If the Examiner alleges that Sato discloses a potential barrier, the relevance of Burke is not understood. In other words, if Sato has the barrier, then bleeding would be prevented and there would be no need for the disclosure of Burke. On the other hand, if Burke is being cited for allegedly disclosing a barrier, then clearly Burke does not cure the deficient disclosure of Sato. Burke's barrier region (*e.g.*, *see* Fig. 2) could at most form two separate areas. In Burke, there is no disclosure or suggestion of the cruciform potential barrier. That is, the combined teachings of Sato and Burke do not disclose or suggest an internal cruciform potential barrier, as set forth in claim 4. For at least this additional exemplary reason, claim 4 is patentable over the combined teachings of these references.

In addition, dependent claim 11 recites "the segments separated by the potential barrier are triangularly shaped" and dependent claim 12 recites "the potential barrier diagonally divides a light receiving unit from the plurality of light receiving units into segments." The Examiner alleges that if one is to view Sato from a 45 degree angle, then the line between photodiodes 11 and 1 and the line between photodiodes 11 and 12 disclose the segments being triangular and the potential barrier diagonally dividing the light receiving unit (*see* page 12 of the Office Action). Applicant respectfully disagrees.

As is clearly visible from Fig. 2 of Sato, the photodiodes (alleged segments) are arranged in a grid-like structure i.e. a 10 by 10 matrix (col. 6, lines 23 to 33). That is, looking at the photodiodes 1-100, at any angle, a formation of a grid-like structure with the photodiodes being squares is observed. Accordingly, Sato does not disclose or suggest the photodiodes being triangularly shaped. Moreover, Sato fails to disclose a barrier (as acknowledged by the Examiner with respect to claim 3) and fails to disclose each section being integrally formed with

various barriers inside. Sato's sections comprise a number of separate elements. Burke only discloses a barrier that can allegedly divide the photodiodes at a straight line. There is no disclosure or suggestion that Burke's barrier can divide the photodiodes diagonally. For at least these additional exemplary reasons, claims 11 and 12 are patentable over Sato in view of Burke.

V. New Claims

In order to provide more varied protection, Applicant adds claims 18-24. Claims 18-22 are patentable at least by virtue of their dependency on claims 1, 2, or 3.

Claim 23 is patentable at least by virtue of its recitation of "wherein each of the plurality of light receiving units is a single, integrally formed storage container for storing the generated charges and comprises a first charge exit to exhaust a first portion of charges generated in the light receiving unit to the exterior of the light receiving unit and a second charge exit different from the first charge exit to exhaust a second portion of charges to the exterior of the light receiving unit, wherein the second portion of charges is other charges different from said first portion of charges ... an adding unit that adds a first charge signal obtained based on the first portion of charges which are transferred through the first charge transfer path and a second charges signal obtained based on the second portion of charge which are transferred through the second charge transfer path, said first portion of charges and said second portion of charges being exhausted from the same light receiving unit at the same time through the first charge exit and the second charge exit." Claim 24 is patentable at least by virtue of its dependency on claim 23.

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VI. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

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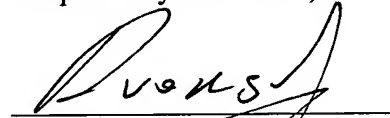
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Date: August 21, 2006

Attorney Docket No.: Q66582